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| 10/071,664 | 02/08/2002 | Hiroshi Nemoto | 791_056 DIV | 4184 |
| 25191 | 7590 | 03/18/2004 | EXAMINER | |
| BURR & BROWN PO BOX 7068 SYRACUSE, NY 13261-7068 | | | ALEJANDRO, RAYMOND | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 1745 | |

DATE MAILED: 03/18/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/071,664

Applicant(s)

NEMOTO ET AL.

Examiner

Raymond Alejandro

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 December 2003 and 28 January 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 11-27 is/are pending in the application.
- 4a) Of the above claim(s) 14, 16 and 19-27 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 11-13, 15, 17-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☒ Certified copies of the priority documents have been received in Application No. 09/348530.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 12/29/03.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. This communication is responsive to the amendments dated 12/24/03 and 01/28/04. The applicants have overcome the 35 USC 112 rejection and the 35 USC 102 rejection. Refer to the abovementioned amendments for specific details on applicant's rebuttal arguments. However, the claims are finally rejected over art as seen below and for the reasons of record:

Election/Restrictions

2. This application contains claims 14-16 and 19-27 drawn to an invention nonelected with traverse in Paper No. 08/06/03. A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.

Information Disclosure Statement

3. The information disclosure statement (IDS) submitted on 12/29/03 was considered by the examiner.

Specification

4. The disclosure is objected to because of the following informalities: the current status (e.g. patented and its patent number) of the nonprovisional parent application should be included. Appropriate correction is required.

Double Patenting

5. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible

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harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

6. Claims 1, 12-13, 15 and 17-18 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-3, 5 and 7-8 of U.S. Patent No. 6368750 in view of Biensan et al 6071645.

Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following reasons:

The US patent '750 claims the following (CLAIMS 1-3, 5 and 7-8):

1. A lithium secondary battery comprising a positive active material including a lithium transition metal compound, said compound being represented by the formula $\text{Li}(\text{Ni}_{x1}\text{Ti}_{x2})_z\text{Mn}_{2-z}\text{O}_4$ wherein z is 0.01 to 0.5, $x1=0.5$, $x2=0.5$, and said positive active material has a spinel configuration of the cubic system.

2. A lithium secondary battery according to claim 1, wherein said lithium transition metal compound further comprises Li as an additional element.

3. A lithium secondary battery according to claim 1, wherein said lithium transition metal compound further comprises Mg as an additional element.

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5. The lithium secondary battery of claim 1, wherein the average ionic radius of the substitution members is within ± 15 percent of the ionic radius of Mn.

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7. The lithium secondary battery according to claim 1, wherein the lithium transition metal compound is composed by firing a mixed compound comprising salts and/or oxides having been prepared with a predetermined ratio in the
5 presence of oxygen within a temperature range of 600° C. and 1000° C. for 5 hours to 50 hours.

8. The lithium secondary battery according to claim 7, wherein the lithium transition metal compound has been synthesized and obtained by conducting at least first and
10 second firing steps, with the firing temperature of the second step being higher than that of the first step.

In this case, the instant application claims are broader or more generic than the patent claims, thus, the instant application claims are anticipated by the patent claims. Accordingly, a broad range is anticipated by a narrow range which lies within the broad limitation. *In re Goodman*.

Additionally, the US patent'750 teaches a lithium secondary battery according to the foregoing aspects. However, the US patent'750 does not expressly disclose the specific carbon negative active material.

Biensan et al reveals a lithium rechargeable electrochemical cell (TITLE & ABSTRACT) comprising one negative electrode wherein the electrochemically active material is selected from carbons among others (COL 2, line 65 to COL 3, lines 5).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to use the specific carbon negative active material of Biensan et al in the lithium secondary battery of the US patent'750 because Biensan et al teach that a negative electrode comprising an electrochemically active material such as carbon is suitable for use in lithium rechargeable cells because carbon material can reversibly intercalate lithium ions into its

structure. Hence, carbon material is a suitable electrochemical active material for lithium rechargeable/secondary batteries.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 1, 11-13, 15 and 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Manev et al 6040089 in view of Biensan et al 6071645.

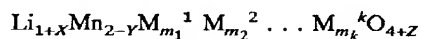
The instant claims are directed to a lithium secondary battery wherein the claimed inventive concept comprises the specific lithium transition metal compound. Other limitations include the additional elements; the average ionic radius; and the firing and synthesizing steps.

Regarding claim 1 and 11:

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Manev et al disclose a positive electrode material for lithium/lithium ion secondary cells wherein the positive electrode material comprises a lithium multi metal oxide having a specific structure as follows (ABSTRACT):

stability. The positive electrode material comprises a lithium multi metal oxide having a spinel structure and described by the general formula:



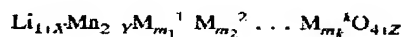
in particular, Manev et al disclose the use of nickel/titanium as a codopant combination (COL 4, lines 39-47). *Thus, Manev et al clearly envisage to substitute the combination of Ni/Ti in the lithium multi-metal oxide formula as part of a specific embodiment.*

nickel/titanium,

[57]

ABSTRACT

The present invention provides a positive electrode material for lithium and lithium-ion secondary cells which exhibits good cycleability, reversible specific capacity, and structural stability. The positive electrode material comprises a lithium multi metal oxide having a spinel structure and described by the general formula:



wherein $\text{M}^1, \text{M}^2, \ldots, \text{M}^k$ are at least two cations different than lithium or manganese, selected from the group consisting of alkaline earth metals, transition metals, B, Al, Si, Ga and Ge;

X, Y, m_1, m_2, \ldots, m_k are numbers between 0 and 0.2;

m_1, m_2 and Y are greater than 0;

Z is a number between -0.1 and 0.2; and

wherein the metals $\text{M}^1, \text{M}^2, \ldots, \text{M}^k$ and the corresponding values m_1, m_2, \ldots, m_k satisfy the following equation and inequality:

$$Y = X + m_1 + m_2 + \cdots + m_k$$

Manev et al also disclose that the lithium metal oxide can include various codopant combinations, for example, combinations of nickel, titanium and magnesium, among other elements (COL 4, lines 39-45):

Although the codopant combination of cobalt and titanium is described as a preferred embodiment for use in the invention, various other combinations can be used in accordance with the invention. For example, combinations of aluminum, cobalt, chromium, copper, iron, gallium, magnesium, nickel, germanium, molybdenum, niobium, titanium, vanadium and tungsten such as aluminum/

and in particular, nickel/titanium (COL 4, lines 45-47):

nickel/titanium,

Manev et al disclose that although the codopant combination of Co and Ti is described as preferred embodiment for use, combinations including nickel/titanium can be used (COL 4, lines 39-46). In that, Manev et al also disclose that in a particularly preferred embodiment the lithium metal oxide spinel compound is codoped with Co^{3+} and Ti^{4+} to form the spinel material; and preferably, in order for the dopants to achieve an specific valency, the molar amounts of Co^{3+} and Ti^{4+} are equivalent (COL 4, lines 27-37). In addition, specific **EXAMPLES 1-2** shows the molar amount $z = 0$, and $M_1 = M_2 = 0.01$. Thus, Manev et al clearly envisage using equivalent molar amounts of the codoping (substitution) elements, and their teaching is fully applicable to the other various combinations including nickel/titanium. Therefore, Manev et al do satisfy anticipation requirements as specific examples in the prior art which are within the claimed range anticipate the range as well as prior art which teaches a range within, overlapping or touching the claimed range anticipates the range provided that prior art range discloses the claimed range with sufficient specificity. (See MPEP 2131.03 Anticipation of Ranges).

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Regarding claim 12:

It is disclosed that M is cation selected from the group consisting of alkaline earth metals (COL 3, lines 45-48), particularly, Manev et al teach that a codopant element can be magnesium (COL 4, line 39-44); wherein magnesium can be used to produce multiple doped lithium manganese oxide spinels which meet the disclosed formula (COL 4, lines 60-62).

Regarding claim 13:

Manev et al disclose that, in addition, a portion of manganese can also be replaced by excess lithium (COL 4, lines 31-35).

Regarding claim 15:

It is taught that the codopants typically have a mean ionic radii size (R_i) which corresponds to the mean ionic radii size of the manganese ions being replaced (COL 4, line 65 to COL 5, line 2).

Regarding claims 17-18:

As to the method limitations, i.e. the firing and the synthesizing steps, it is noted that a method limitation incorporated into a product claim does not patentable distinguish the product because what is given patentably consideration is the product itself and not the manner in which the product was made. Therefore, the patentability of a product is independent of how it was made. *However, Manev et al disclose the following* (COL 6, lines 45-63):

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45 The mixture once prepared can be reacted by a solid state
reaction to form the multiple-doped lithium manganese
oxide spinel compounds of the invention. Preferably, the
mixture is reacted by firing the mixture at an elevated
50 temperature between about 400° C. and about 900° C. in the
presence of oxygen, e.g., in an atmosphere with a partial
pressure of oxygen of at least 20 kPa. The mixture can be
fired in one step but is preferably fired in more than one step
to produce the spinel compound. Preferably, the mixture is
fired at a temperature between about 400° C. and about 500°
55 C. for 1 to 24 hours, at a temperature between about 500° C.
and about 600° C. for 1 to 24 hours, and at a temperature of
between about 700° C. and about 900° C. for 1 to 24 hours.
Additional firing steps can also be used in the invention to
improve the quality of the resulting spinel as described, e.g.,
60 in U.S. Pat. No. 5,718,877, which is hereby incorporated in
its entirety by reference. Once the mixture has been fired to
form the multiple-doped lithium manganese oxide spinel
compound, this compound is preferably cooled to ambient

Manev et al teach a lithium secondary battery according to the foregoing aspects.

However, Manev et al do not expressly disclose the specific carbon negative active material.

Biensan et al reveals a lithium rechargeable electrochemical cell (TITLE & ABSTRACT)
comprising one negative electrode wherein the electrochemically active material is selected from
carbons among others (COL 2, line 65 to COL 3, lines 5).

In view of the above, it would have been obvious to one skilled in the art at the time the
invention was made to use the specific carbon negative active material of Biensan et al in the
lithium secondary battery of Manev et al because Biensan et al teach that a negative electrode
comprising an electrochemically active material such as carbon is suitable for use in lithium
rechargeable cells because carbon material can reversibly intercalate lithium ions into its
structure. Hence, carbon material is a suitable electrochemical active material for lithium
rechargeable/secondary batteries.

Response to Arguments

10. Applicant's arguments, see the amendments filed 12/24/03 and 01/28/04 for specific details, with respect to the rejection(s) of claim(s) 1, 11-13, 15 and 17-18 under the 35 USC 102 statute have been fully considered and are persuasive. Therefore, the rejection has been overcome. However, upon further consideration, a new ground(s) of rejection is made as seen above. Accordingly, applicant's arguments with respect to claims 1, 11-13, 15 and 17-18 have been considered but are moot in view of the new ground(s) of rejection.

11. In addition, the examiners like to briefly address applicants' arguments regarding the declaration under 37 CFR 1.132 filed 12/24/03 and which reports the achievement of unexpected results. In that, it is first noted that the foregoing performance characteristic of the exemplified battery cell does not reflect or correspond to the performance characteristic of the claimed lithium secondary battery because the objective evidence of nonobviousness is not commensurate in scope with the instant claims which the evidence is offered to support. For instance, it is noted that the data of Table 1 showing improved internal resistance ratio of coin cells does not evidence unexpected results for the entire claimed range of $X_1 > 0$, $X_2 > 0$ wherein $X_1 + X_2 = 1$ because as apparent from the results shown in Table 1 on page 22 and in page 3 of the declaration, significant internal resistance ratio of coin cell is expected when $X_1 = .005$ or 0.05 , $X_2 = .005$ or 0.05 and not within the entire range of $0 < X_1 \leq 1.0$ and $0 < X_2 \leq 1.0$ as presently claimed. For that reason, it is contended that the objective evidence of nonobviousness is not commensurate in scope with the present claims.

Furthermore, the examiner also likes to contend that such results and, thus, the specific battery cell as prepared in EXAMPLES A, B, C, D and Ref. A (Embodiment 6) and Ref. B

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(Embodiment 7) are not commensurate with the specific lithium secondary battery as instantly claimed. In this respect, it is emphasized that the claimed lithium secondary battery lacks significant, essential, vital and/or crucial features, for instance: a) the specific positive active material composition including the specific compound molar ratio, conducting agent (*i.e. the acetylene black powder*), bonding material (*i.e. polyvinylidene fluoride*) and their weight contents; b) the specific positive active material imparted structure (*i.e. the pressed material*); c) the specific electrolyte (*i.e. the particular dissolved lithium salt LiPF_6 and organic solvents ethylene carbonate and diethyl carbonate used therefor*) and their volume ratios as presented in EXAMPLES A, B, C, D and Ref. A (Embodiment 6) and Ref. B (Embodiment 7). Thus, the foregoing performance characteristics of the exemplified battery cell does not reflect or correspond to the performance characteristic of the claimed lithium secondary battery. *This raises the issue of whether or not the synergistic effect of each and every battery cell component positively/negatively affects the internal resistance ratio of the coin cell, too.*

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Raymond Alejandro
Examiner
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A handwritten signature in black ink, appearing to read 'RAM', with a long, sweeping horizontal stroke underneath.